$$u^* = \sqrt{uv}$$

Pascal Michaillat, Emmanuel Saez
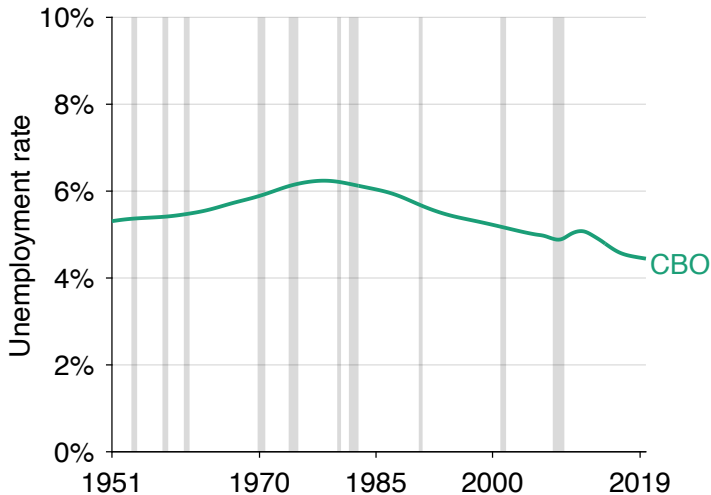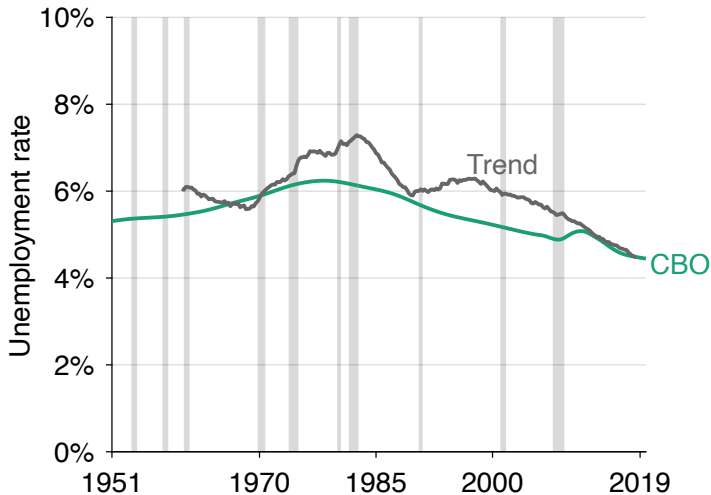
May 2023

# ROLES OF EFFICIENT UNEMPLOYMENT RATE, $u^*$

1. sufficient statistic for optimal policy over the business cycle

    – monetary policy (Michaillat, Saez 2022)

    – fiscal policy (Michaillat, Saez 2019)

    – unemployment insurance (Landais, Michaillat, Saez 2018)

    – immigration (Michaillat 2023)

2. welfare-based measure of "full employment"

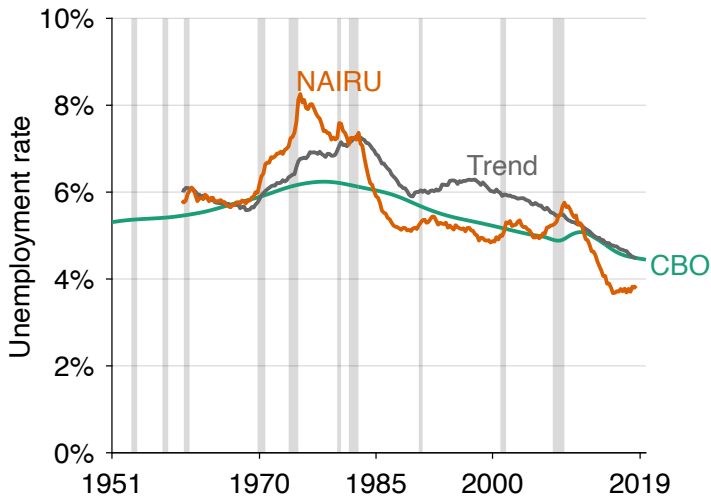    – Full Employment and Balanced Growth Act of 1978
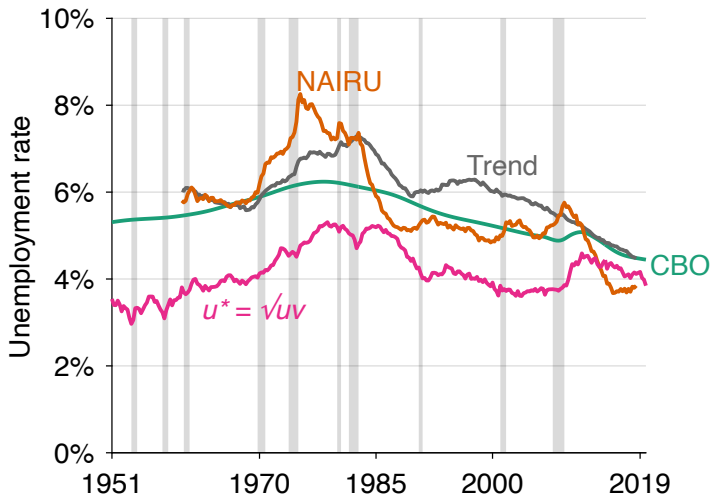
# EXISTING MEASURES OF "FULL EMPLOYMENT"

# EXISTING MEASURES OF "FULL EMPLOYMENT"



Chart: Line graph with x-axis labeled from 1951 to 2019 and y-axis labeled "Unemployment rate" ranging from 0% to 10%. Two lines shown: "Trend" (gray) and "CBO" (green).

# EXISTING MEASURES OF "FULL EMPLOYMENT"

# THIS PAPER: WELFARE-BASED "FULL EMPLOYMENT"

# THEORY

# COMPOSITION OF LABOR FORCE

1. share $u$ of labor force is unemployed
   – no home production (Borgschulte, Martorell 2018)
2. share $v$ of labor force is employed and recruiting
   – one worker per vacancy (National Employer Survey 1997)
3. share $1 - (u + v)$ of labor force is employed and producing
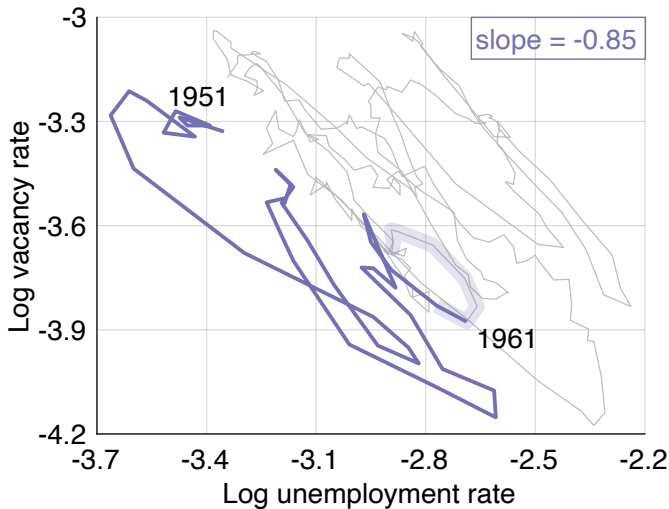   – production determines social welfare
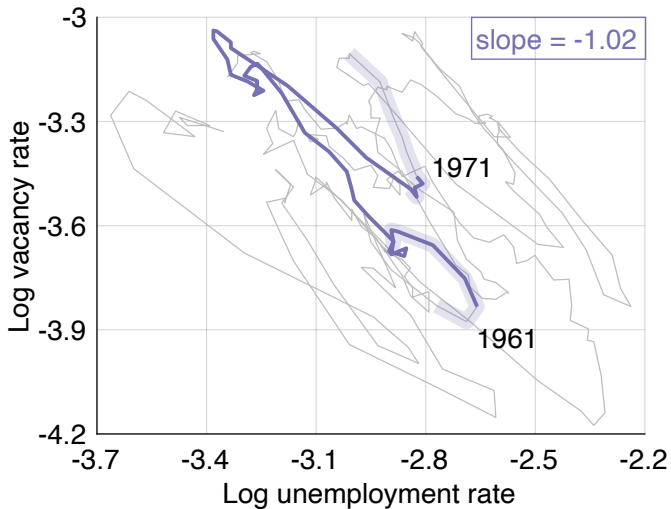
# US LABOR-FORCE PARTICIPATION ≈ ACYCLICAL
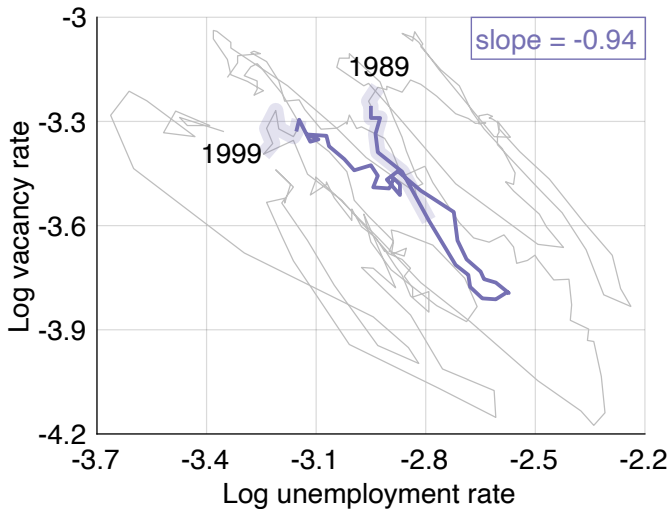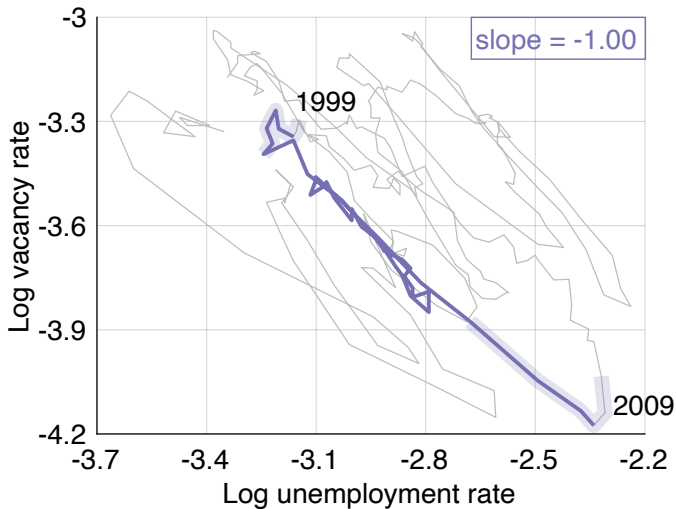


25–54 years
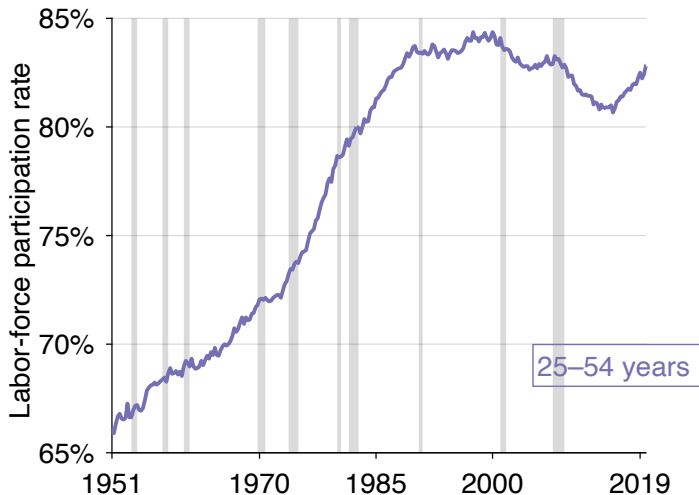
# US MARGINAL ATTACHMENT RATE ≈ 1%
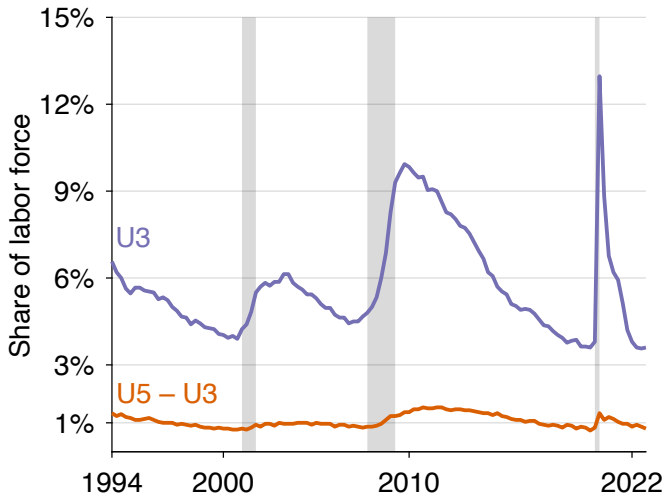
## US BEVERIDGE CURVE ≈ HYPERBOLA

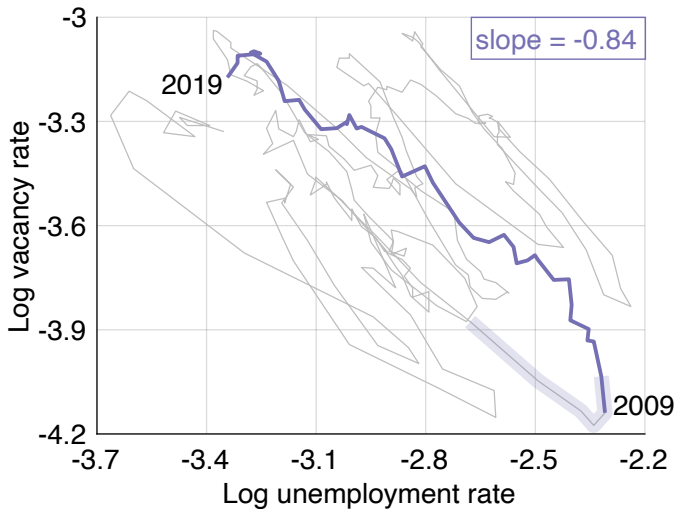## US BEVERIDGE CURVE ≈ HYPERBOLA

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# US BEVERIDGE CURVE ≈ HYPERBOLA

# SOCIAL PLANNER'S PROBLEM

- minimize nonproductive use of labor $u + v$

- subject to hyperbolic Beveridge curve $uv = A$

- unconstrained minimization with convex objective: $u + A/u$

- first-order condition is necessary and sufficient to find solution:

$$\frac{d[u + A/u]}{du} = 0 \implies 1 - A/u^2 = 0$$

- solution is efficient unemployment rate:

$$u^* = \sqrt{A}$$

# EFFICIENT UNEMPLOYMENT RATE $u^*$

- $u^*$ is geometric average of $u$ and $v$:

$$u^* = \sqrt{uv}$$

- economy is inefficiently tight when $u < u^*$ or

$$u < v$$

- economy is inefficiently slack when $u > u^*$ or

$$u > v$$

## WELFARE FOUNDATION FOR OLD INTUITION THAT FULL EMPLOYMENT OCCURS WHEN $u \approx v$

- before Beveridge (1944) report:
    - "Full employment is a state of affairs in which the number of unfilled vacancies is not appreciably below the number of unemployed persons."
- in Beveridge (1944) report:
    - "Full employment means having always more vacant jobs than unemployed men."
- US BLS and Japanese Ministry of Health, Labour, Welfare:
    - flag when # jobseekers per job opening > 1

# GENERALIZATION (MICHAILLAT, SAEZ 2021)

- home production per unemployed worker: $0 \to \zeta$

- # recruiters per vacancy: $1 \to \kappa$

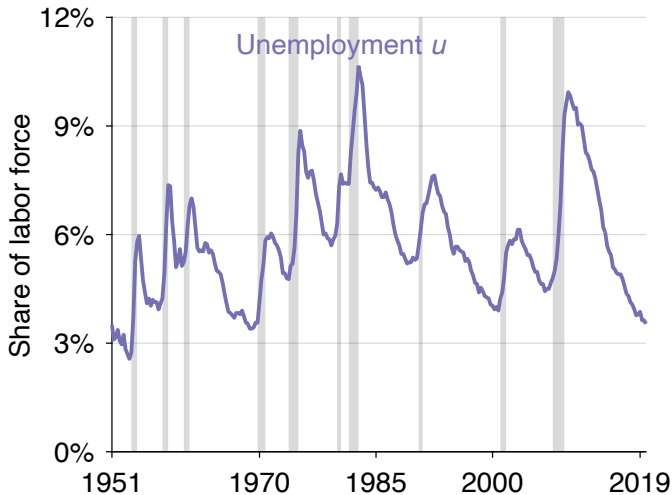- Beveridge curve: $v = A/u \to v = A/u^\epsilon$

- efficient unemployment rate:

$$u^* = \sqrt{uv} \quad \to \quad u^* = \left( \frac{\kappa \cdot \epsilon}{1 - \zeta} \cdot v \cdot u^\epsilon \right)^{1/(1+\epsilon)}$$

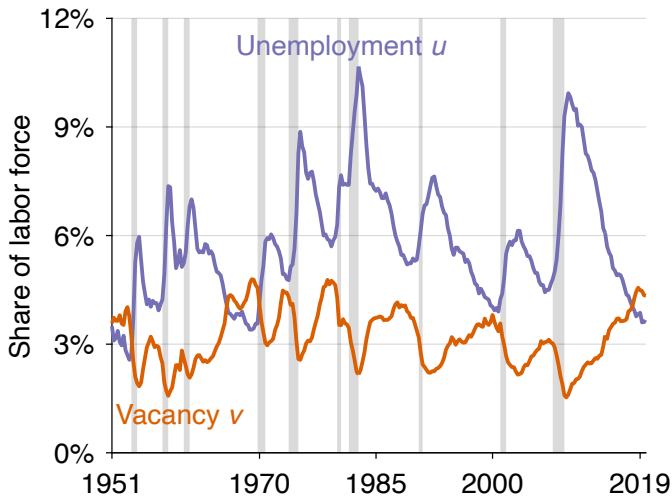# $u^*$ WITH $\zeta = 0.96$ (HAGEDORN, MANOVSKII 2008)
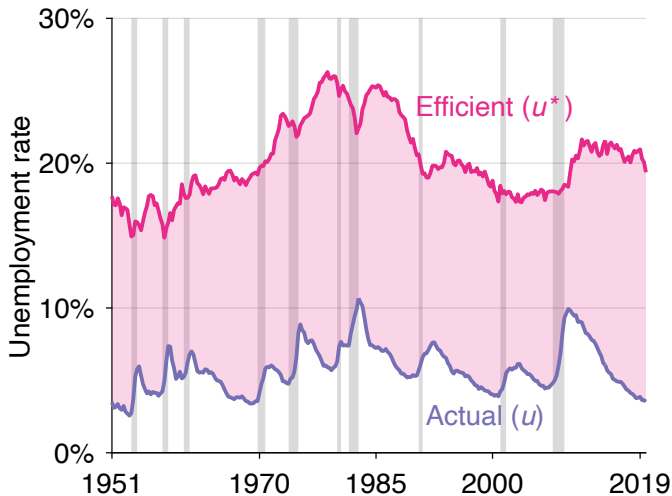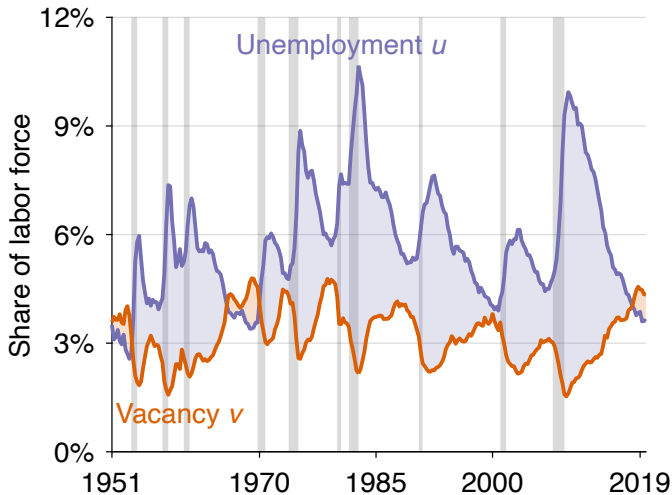
# POSTWAR IN THE UNITED STATES

## UNEMPLOYMENT RATE (CPS)
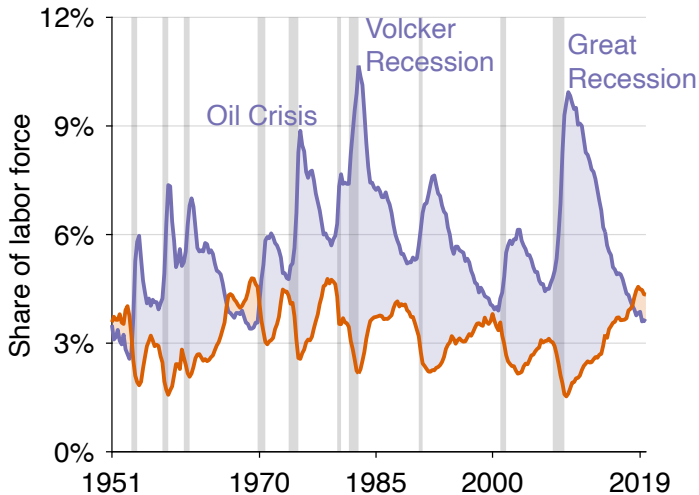


Unemployment $u$

VACANCY RATE (BARNICHON 2010, JOLTS)

# ECONOMY IS GENERALLY TOO SLACK...

# ... AND IS ESPECIALLY SLACK IN SLUMPS



Chart showing "Share of labor force" (y-axis, 0% to 12%) versus years (x-axis, 1951 to 2019). Labels include "Oil Crisis", "Volcker Recession", and "Great Recession".

# ECONOMY IS TOO TIGHT DURING WARS



Chart showing share of labor force from 1951 to 2019 with two lines (purple and orange). Labels: Korean War, Vietnam War, Trump. Y-axis: Share of labor force, ranging 0% to 12%.
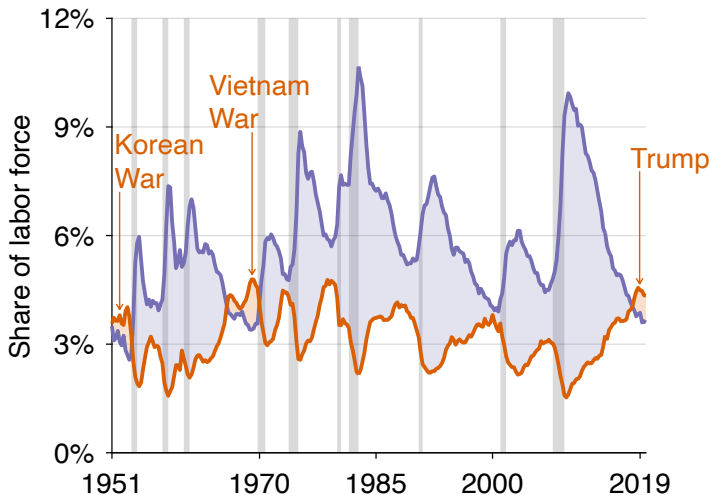
# TIGHTNESS *v/u* SUMMARIZES STATE OF ECONOMY
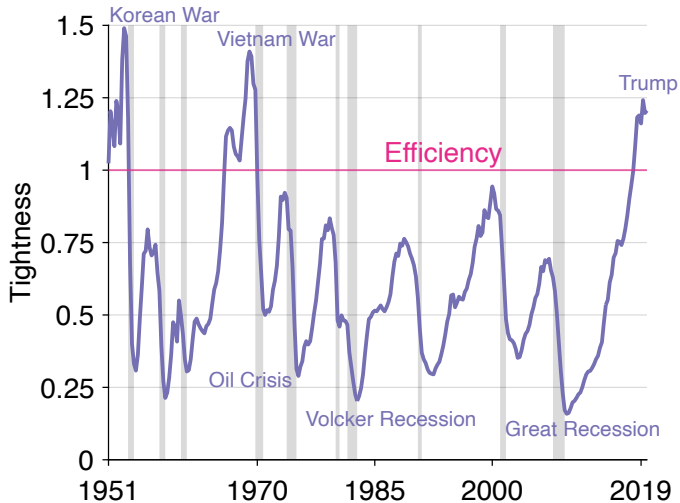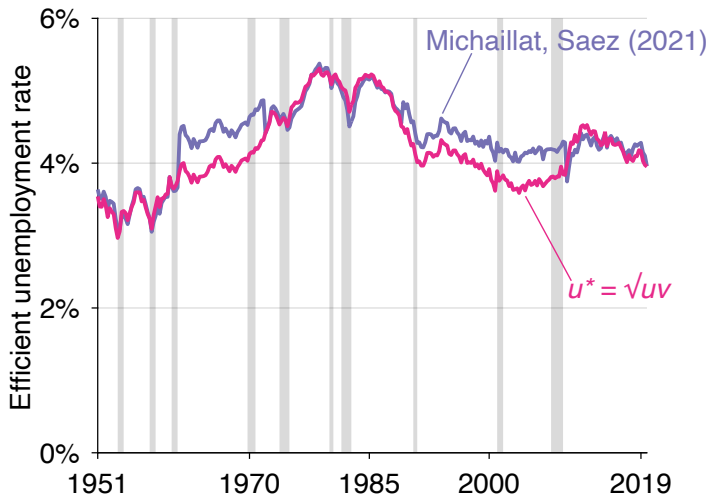
# $u^*$ REMAINS IN 3.0%–5.3%, AVERAGES 4.2%
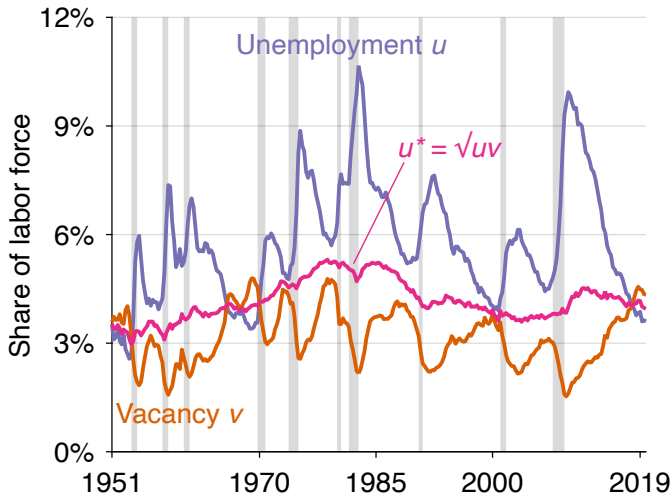
# UNEMPLOYMENT GAP IS COUNTERCYCLICAL
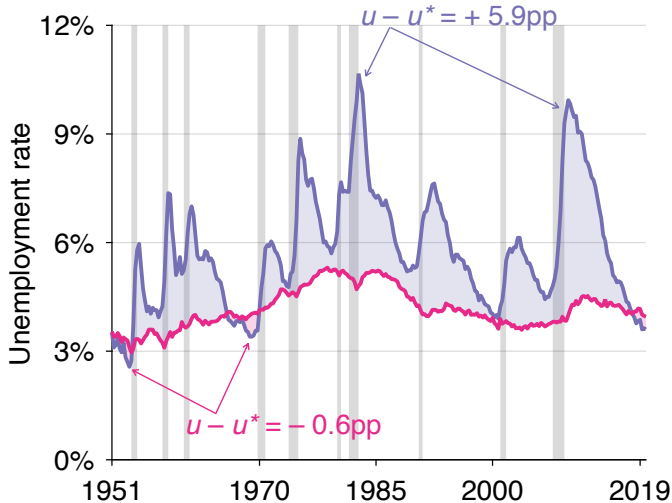
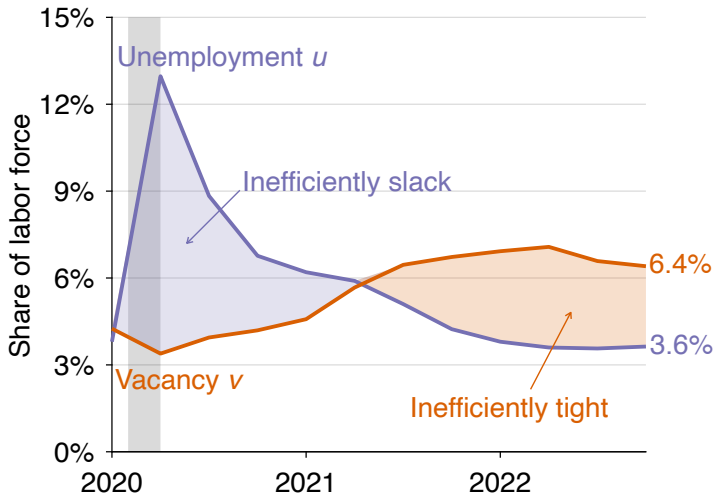# COMPARISON WITH MICHAILLAT, SAEZ (2021)
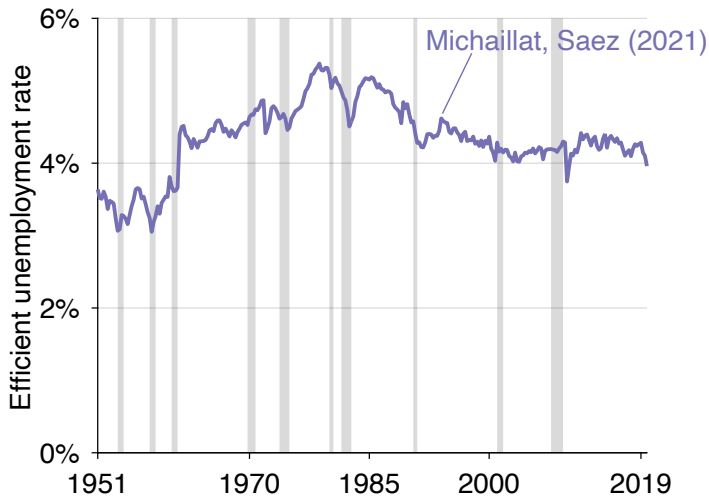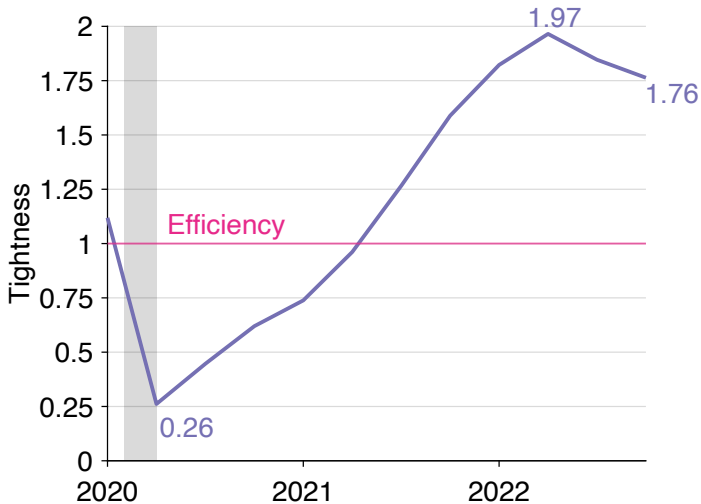
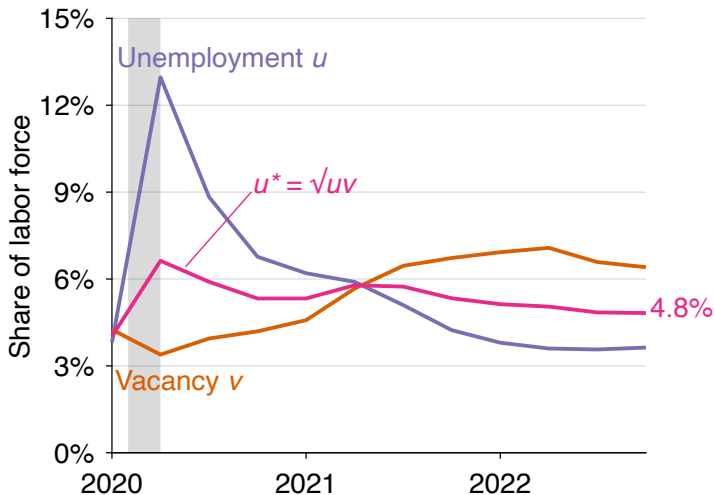# COMPARISON WITH MICHAILLAT, SAEZ (2021)

# PANDEMIC IN THE UNITED STATES

# ECONOMY HAS BEEN TOO TIGHT SINCE 2021Q3

Share of labor force

Unemployment $u$

Inefficiently slack

Vacancy $v$

Inefficiently tight

6.4%

3.6%

15%
12%
9%
6%
3%
0%

2020    2021    2022
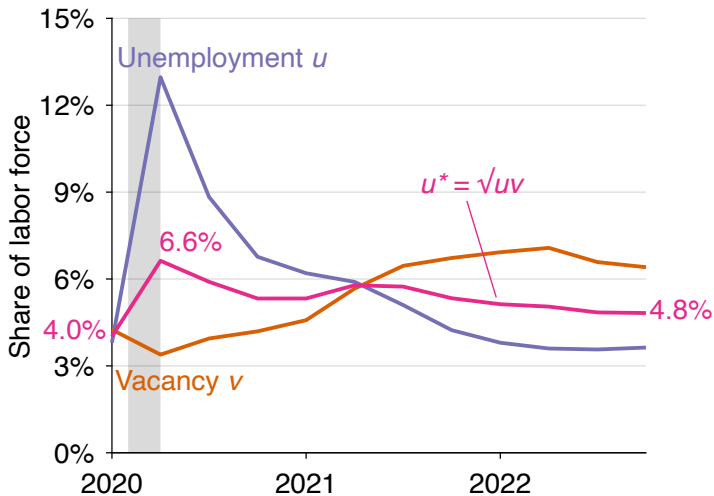
# BUT ECONOMY HAS BEEN COOLING SINCE 2022Q2
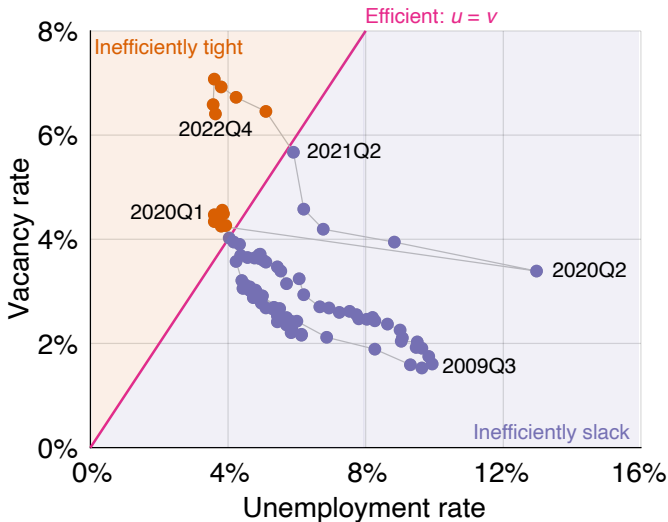
# CURRENT TARGET FOR MONETARY POLICY: $u^* = 4.8\%$

# MOST EXTREME UNEMPLOYMENT GAPS SINCE WW2
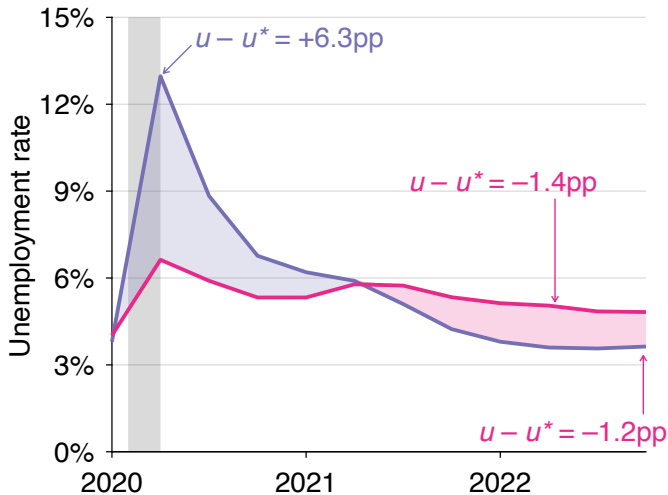
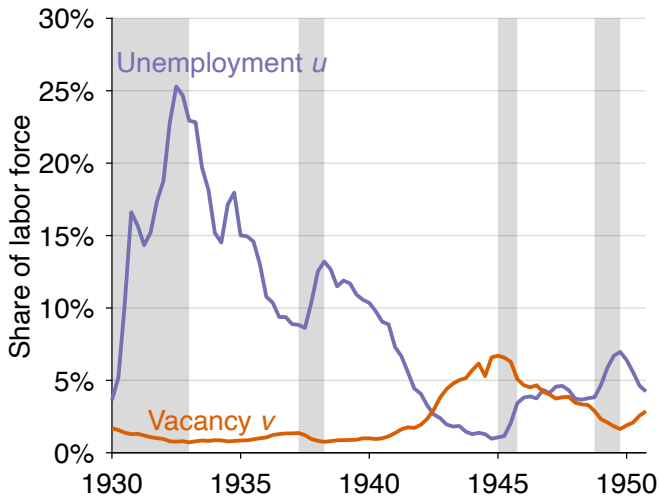# WHY DID $u^*$ INCREASE SO MUCH IN 2020?

# BECAUSE OF LARGE OUTWARD SHIFT OF BEVERIDGE CURVE IN 2020Q2
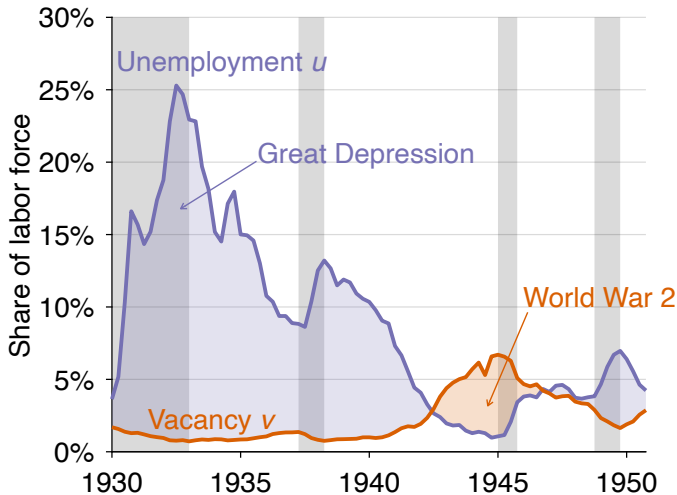
# GREAT DEPRESSION IN THE UNITED STATES
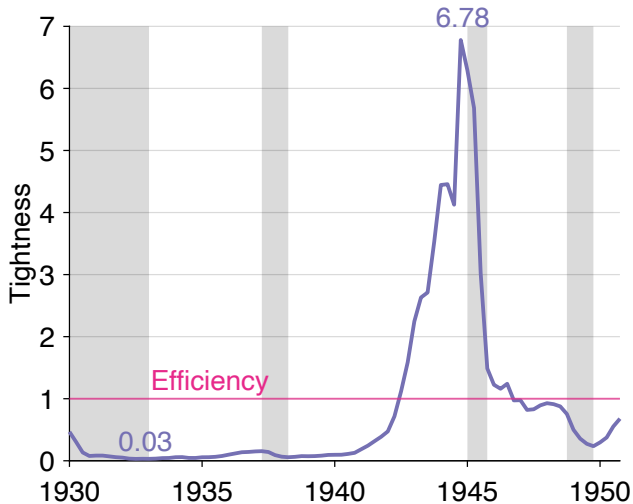
# NBER DATA (PETROSKY-NADEAU, ZHANG 2021)
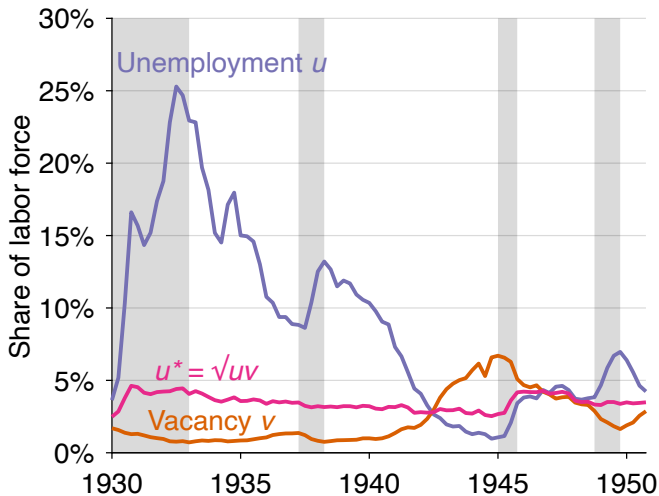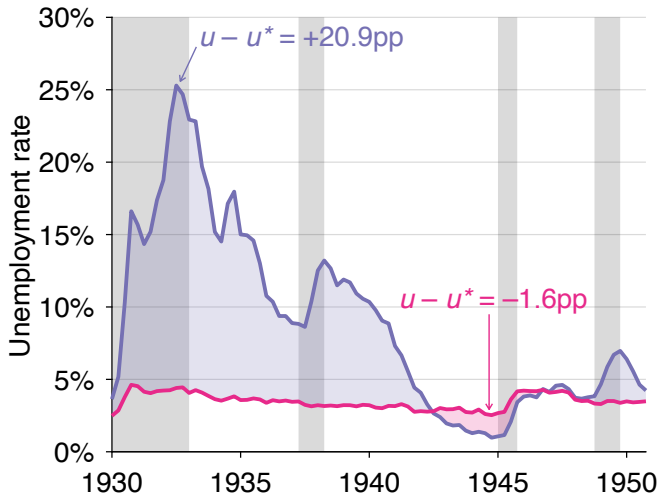
# BEVERIDGE CURVE ≈ HYPERBOLA

# ECONOMY WAS TOO SLACK UNTIL WW2

# LOWEST AND HIGHEST TIGHTNESS ON RECORD
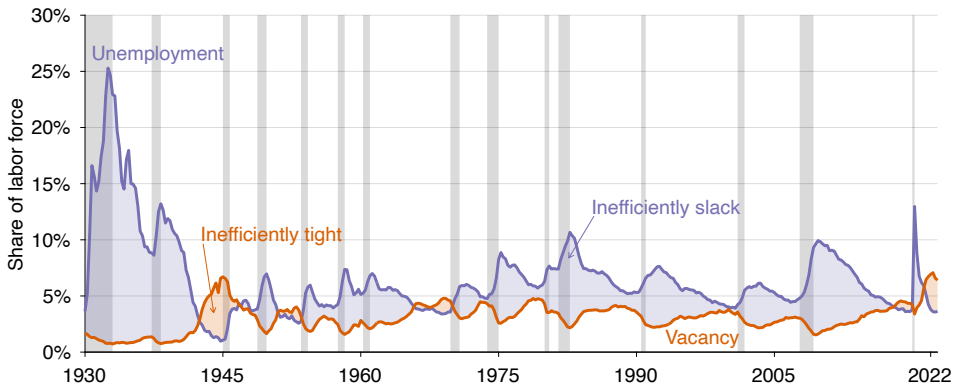
# $u^*$ REMAINS IN 2.5%–4.6%, AVERAGES 3.5%

# MOST EXTREME UNEMPLOYMENT GAPS ON RECORD



$u - u^* = +20.9\text{pp}$

$u - u^* = -1.6\text{pp}$

# SUMMARY

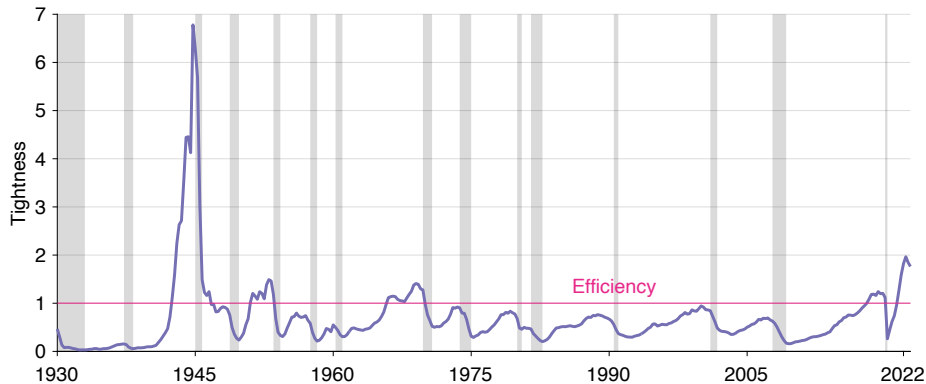# EFFICIENCY CRITERION FOR US LABOR MARKET

# AN EQUIVALENT EFFICIENCY CRITERION

$u^* = \sqrt{uv}$ AVERAGES 4.1% OVER 1930–2022